Data Sheet
FST-2005

Filled System Temperature Indicators

Rigid Stem and Distance Reading Thermometers

Models NR1, NR2, NC1 & NC2

- Available in 100mm and 150mm dial sizes
- Rigid Stem or Distance Reading Versions
- Available with all stainless steel construction
- Non Toxic “Filsafe” filling medium
- Adjustable micrometer pointer available
- Class 1 Accuracy to EN837
- Simple installation and low maintenance
- Available with electical contact head systems

Introduction

The Rototherm range of filled system thermometers offer tough yet accurate instruments with rigid stems for direct mounting or with flexible capillary for remote reading.

Most models in the range may be specified with electrical contact heads to provide alarm or control functions.

Rototherm non toxicfilled system thermometers are designed to give guaranteed reliability over a wide range of

Simple to Install and Maintain

A choice of mounting options enables simple installation -either direct mounting to the process, in a panel or surface mounting.

Rototherm Quality

The Rototherm range of filled system thermometers are designed, manufactured and tested to ISO9001:2000. Each gauge carries Rototherm’s standard 12 month warranty.

Rototherm™
instrumentation and control

Filled System Temperature Indicators

Rigid Stem and Distance Reading Thermometers

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Rigid Stem Thermometers

NR1 General Purpose Thermometers

Tough accurate thermometers housed in a gasket sealed plastic (DMC) case with adjustable zero. Instruments can be configured as vertical or horizontal mounting.

Model	Dial Size	Mounting	Filling
NR1 42	100mm	Bottom entry	Non Toxic
NR1 46	100mm	Back entry	Non Toxic

NR2 Stainless Steel Cased Thermometers

Reliable, accurate industrial thermometers housed in a stainless steel case with the option of 100mm or 160mm diameter dial.

Model	Dial Size	Mounting	Filling
NR2 42	100mm	Bottom entry	Non Toxic
NR2 46	100mm	Back entry	Non Toxic
NR2 62	160mm	Bottom entry	Non Toxic
NR2 66	160mm	Back entry	Non Toxic

Capillary Thermometers

Where display is required some distance from the sensing point, for example on an instrument panel, capillary thermometers should be used. The dial can be located up to 30 metres from the sensing point and isolated from dirt and vibration. The sensing bulb is connected by stainless steel microbore capillary, protected by stainless steel tubing. For severe conditions, flexible armour can extend the entire length of the capillary. Alternative protections can be specified if required.

NC1 General Purpose Thermometers

Tough accurate thermometers housed in a gasket sealed plastic (DMC) case with adjustable zero.

Model	Dial Size	Mounting	Filling
NC1 42	100mm	Bottom entry	Non Toxic
NC1 46	100mm	Back entry	Non Toxic

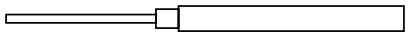
NC2 Stainless Steel Cased Thermometers

Reliable, accurate industrial thermometers housed in a stainless steel case with the option of 100mm or 160mm diameter dial.

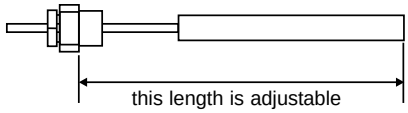
Model	Dial Size	Mounting	Filling
NC2 42	100mm	Bottom entry	Non Toxic
NC2 46	100mm	Back entry	Non Toxic
NC2 62	160mm	Bottom entry	Non Toxic
NC2 66	160mm	Back entry	Non Toxic

Bulb Types

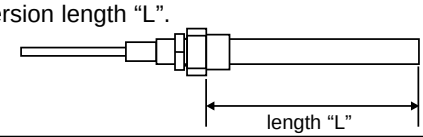
Type 301
This bulb is used when no fitting is required. The bulb may be held in place by a bracket or a clip (not supplied by Rototherm).



Type 302
This bulb has a fitting which slides along the capillary and is tightened into the required position. Bulb length cannot be specified.



Type 303
The fitting is located on the bulb. When ordering please confirm immersion length “L”.



Specifications - NR1 & NR2

Case & Bezel

NR1	Glass filled polyester resin, non toxic, fire retardant, black. Weatherproof IP67
NR2	304 stainless steel. 316 stainless steel option.Weatherproof IP67

Dial
Clearly marked black characters on white background

Window
Glass as standard. Options - acrylic and toughened glass.

Stem
316 stainless steel

Stem Dimensions
12.7mm diameter, Standard stem lengths 200mm, 300mm, 400mm and 500mm. Sensitive length X depends on temperature range and filling medium and is indicated by shallow waisting.

Temperature Range
See table for standard temperature ranges

Accuracy
±1.0% FSD (±2% when electrical contact heads are fitted)

Ambient Temperature
Head compensated for variation in ambient temperature from -30 to +50ºC.

Movement
Direct acting bourdon tube with bimetallic compensator. Option silicone damped.

Specifications - NC1 & NC2

Case & Bezel

NC1	Diecast aluminium. Weatherproof IP67
NR2	304 stainless steel. 316 stainless steel option. Weatherproof IP67

Dial
Clearly marked black characters on white background

Window
Glass as standard. Options - acrylic and toughened glass.

Bulb / Stem
316 stainless steel. See page 9 for standard bulb types.

Stem Dimensions
Microbore stainless steel tube with 3mm OD stainless steel protection. Maximum capillary length 30 metres (for Gas filled instruments) 12 metres (for Xylene filled instruments)

Temperature Range
See table for standard temperature ranges

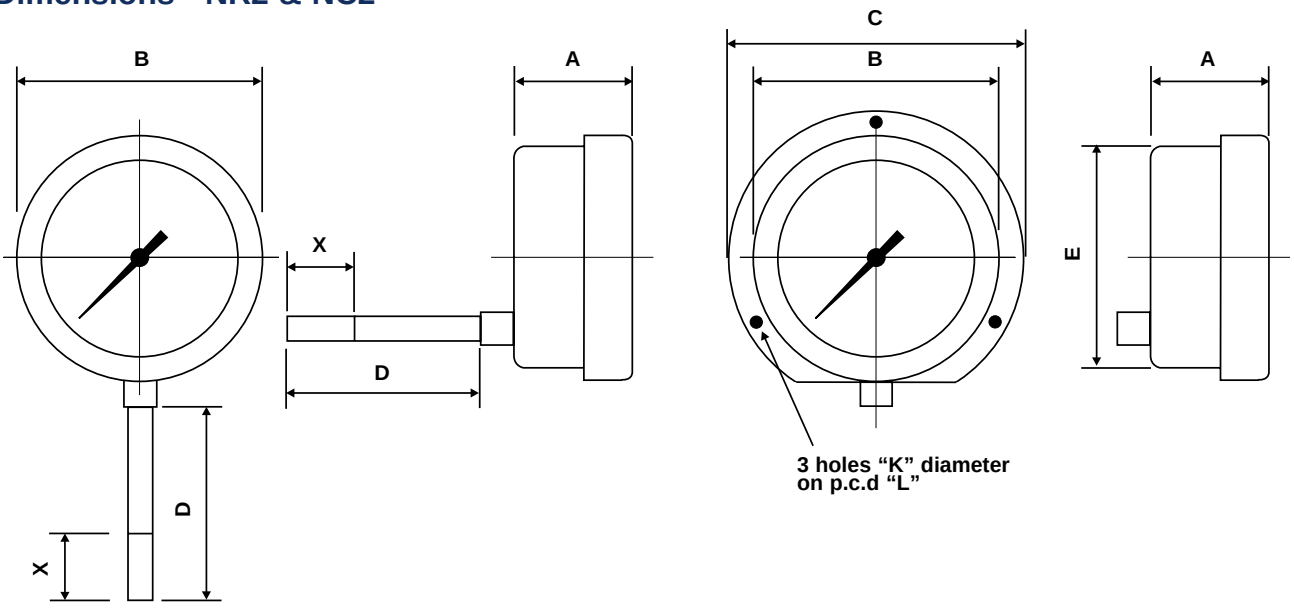
Accuracy
±1.0% FSD (±2% when electrical contact heads are fitted)

Ambient Temperature
Head compensated for variation in ambient temperature from -30 to +50ºC.

Temperature Ranges

Temperature Ranges		Approximate “X” Dimensions	
		stem diameter 12.7mm	
ºC	ºF	Non-toxic Filsafe	
		Xylene	Gas
-30 / +70	-20 / 160	30mm	N/A
0 / 60	30 / 140	40mm	N/A
0 / 100	30 / 220	30mm	N/A
0 / 120	30 / 250	30mm	N/A
0 / 160	30 / 300	25mm	N/A
0 / 200	50 / 400	25mm	125mm
0 / 300	0 / 550	N/A	125mm
0 / 400	0 / 700	N/A	125mm

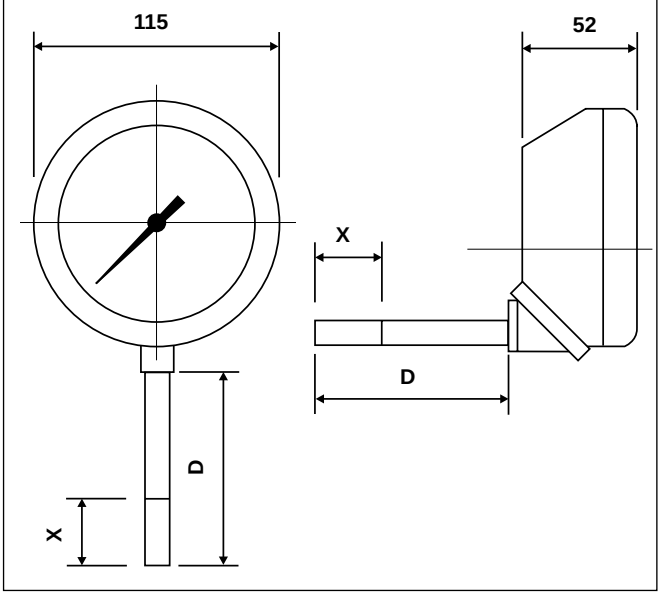
Dimensions - NR2 & NC2



Dimension	Back Flange		Panel Mounting		Bracket Mounting		Direct Mounting	
	100mm	160mm	100mm	160mm	100mm	160mm	100mm	160mm
A	52mm	52mm	47mm	47mm	47mm	47mm	47mm	47mm
B	112mm	171mm	112mm	171mm	112mm	171mm	112mm	171mm
C	135mm	196mm	-	-	-	-	-	-
E	-	-	97mm	158mm	-	-	97mm	158mm
Panel Cut Out	-	-	100mm	161mm	-	-	-	-
Weight	1.2kg	1.8kg	1.2kg	1.8kg	1.2kg	1.8kg	1.2kg	1.8kg
K	6mm	6mm	-	-	-	-	-	-
L	116mm	178mm	-	-	-	-	-	-

All dimensions are in mm. Drawings are for illustration purposes only.

Dimensions - NR1



All dimensions are in mm. Drawings are for illustration purposes only.

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Rigid Stem and Distance Reading Thermometers

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■ Order Codes - Rigid Stem Thermometers

CASE
General Purpose

Stainless Steel

FILLING
Non Toxic NR1

Non Toxic NR2

DIAL SIZE AND STEM ENTRY
100mm diameter, bottom entry 42
100mm diameter, back entry 46
160mm diameter, bottom entry 62
160mm diameter, back entry 66

WINDOW
Glass A
Acrylic B

STEM LENGTH
Insert stem length “D” in mm

TEMPERATURE RANGE
Insert range from table

UNITS
ºC, ºF or ºC & ºF

FITTINGS / GLANDS
No fitting A
Gland 1/2” BSP B
Other C

GLAND MATERIAL
No gland D
Mild steel E
Stainless steel F
Other G

OPTIONAL FEATURES
Electrical contact head type A MR2/NR2 models only A
Electrical contact head type B MR2/NR2 models only B
Electrical contact head type C MR2/NR2 models only C
Electrical contact head type D MR2/NR2 models only D
Electrical contact head type E MR2/NR2 models only E
None required X
Maximum pointer F
Minimum pointer G
Index pointer H

Example Order Code - Rigid Stem Thermometer

Rigid stem thermometer. Stainless steel cased, non toxic filsafe. 100mm diameter, bottom entry with acrylic window. Stem length 150mm. Temperature Range 0-100ºC. No fitting required but with single electric contact to make on rise in temperature.

NR2	42	B	150	0-150	C	A	D	B

■ Order Codes - Capillary Thermometers

CASE
Diecast aluminium

Stainless Steel

FILLING
Non Toxic NC1

Non Toxic NC2

DIAL SIZE AND STEM ENTRY
NC1
100mm diameter, bottom entry 42
100mm diameter, back entry 46
160mm diameter, bottom entry 62
160mm diameter, back entry 66
NC2
100mm diameter, back flange 42
100mm diameter, panel mounting 46
100mm diameter, bracket mounting 48
160mm diameter, back flange 62
160mm diameter, panel mounting 66
160mm diameter, bracket mounting 68

WINDOW
Glass A
Acrylic B

BULB
Type 301 1
Type 302 2
Type 303 3

CAPILLARY PROTECTION
Stainless steel tube, 3mm diameter C1
Copper tube, 3mm diameter C2
Stainless steel interlock (flexible) 6.3mm diameter C3
Stainless steel interlock 6.3mm diameter over stainless steel C4
Other X5

CAPILLARY LENGTH
Insert length in metres (3 metres standard)

TEMPERATURE RANGE
Insert range from table

UNITS
ºC, ºF or ºC & ºF

FITTINGS / GLANDS
No fitting A
Gland 1/2” BSP B
Other C

GLAND MATERIAL
No gland D
Mild steel E
Stainless steel F
Other G

OPTIONAL FEATURES
Electrical contact head type A NC2 models only A
Electrical contact head type B NC2 models only B
Electrical contact head type C NC2 models only C
Electrical contact head type D NC2 models only D
Electrical contact head type E NC2 models only E
None required X
Maximum pointer F
Minimum pointer G
Index pointer H

Example Order Code - Capillary Thermometer

Stainless steel cased, non toxic filsafe. 100mm diameter, panel mounted with glass window. Type 303 bulb with stainless steel capillary 3 metres long. Temperature range 0-100ºC. Stainless steel gland 1/2” BSP. No optional features.

NC2	46	A	3	C1	3	0-100	C	B	F	X

Accesories & Optional Features

Electrical Contact Heads

To provide alarm or control functions, 100 and 160mm nominal dial instruments can be specified with electrical contact heads mounted in a clear plastic window which replaces the standard one. The set point can be adjusted to any position on the scale with a removable key. Single and dual contacts systems are available.

Electrical contact heads provide a repeatable switching point, but the absolute accuracy tolerance of the instrument is approximately doubled by the contacts.

Contact Rating
Standard contact head assemblies: 250V, switching capacity 10W, 18VA, maximum current 0.7A.
Service
Indoor use, ambient temperature -10/70ºC, free from vibration
Application
100 and 150mm nominal dial size instruments

System	Operation	Typical Application
A	Break on rise	Temperature control
B	Make on rise	Over temperature alarm
E	Break on rise and make on rise in temperature	Temperature control plus alarm

Electrical contact heads are available on the following instruments:

BH2 Heavy Duty Bimetallic Thermometers - 100mm and 160mm dial size only. Stem diameter must be 12.7 mm. Contact Type A, B and E

Thermowells

Used predominantly in the power, process, pharmaceutical and petrochemical industries, thermowells are used to protect temperature indicators and sensors from process media and to enable servicing or replacement of indicators without the need to shut down plant.

Rototherm thermowells are designed to meed standards established by BSI, DIN, ASME and other authorities as well as established company standards such as BP, Shell, CEGB, ICI etc.

Thermowells are available fabricated from tube, drilled from barstock or from forgings. Full material certification including original mill and suppliers material certificates can be provided. If required NACE standard MR-01-75 requirements can be met.

Process Connections

Rototherm thermowells are available with both flanged and screwed process connections including:

FLANGES - ANSI, BS, and DIN (others also available)
SCREWED - NPT, API, BSP and ISO

Dye penetrant or radiographic inspection of welds is available if required. Flanged thermowells can also be manufactured from “one piece” forgings removing the need for welding.

Compression Glands / Fittings

Compression glands tighten on the stem to provide liquid and gas tight seal. Once fitted the position of the thermometer can only be altered by cutting off the olive and replacing it with a new one.

Add 50mm for BSP threads (75mm for NPT threads) to desired immersion length to obtain minimum “D” dimension).

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